

# The Interim

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Curriculum Supplement For Schools

The *Interim Plus* is a periodical dedicated to educational matters and specifically designed to assist teachers in integrating relevant life issues in their lesson planning.

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The Climate Change Debate



Welcome back and Happy New Year. Hopefully the Christmas break was enjoyable and restful, enough to recharge the batteries and finish the first semester. We have been experiencing quite a protracted cold snap and lots of snow. But it is Canada! Which leads us right into the topic for this January edition of *The Interim Plus*. Is this typical weather or a harbinger of weird extreme things to come because of changing global climatic conditions?

Global warming? Climate Change? Are they the same thing? How does one discern the differences? Can one make sense of apparently conflicting

data? What are the implications for each set of arguments if respectively correct? Powerful forces are lined up on either side of the issue. Because the economic, political, social and philosophical implications are serious, it is wise to study the issue for a better understanding of what may be at stake. This edition of *The Interim Plus* curriculum supplement may be of use for high school courses in geography, economics, world politics, sciences, even religion and philosophy.

There are both myths and facts surrounding the issue of “climate change”. The claim has been made that 97% of scientists agree that there is global warming and that it is being caused by man-made activities that release excessive amounts of noxious greenhouse gases, chiefly carbon dioxide. As a consequence, there is a warming of the planet, with polar ice caps melting at a perilous rate, with ocean levels rising and soon to inundate coastal cities and islands, destroying huge swaths of humanity in the process. The catastrophe would create social chaos as nations engage in a feverish competition to control shrinking natural resources. All this is inevitable unless something

is done in time to stop this “climate change”. Governments are responding to this threat by striking accords that would lead to international regulations to control and reduce greenhouse gases and encourage green energy use.

But much of this is disputed by other scientists who claim that the whole “climate change” concept is really bogus, and perhaps a scam to transfer wealth from the developed nations to the poorer nations of the world. They also claim that the science behind the global warming bandwagon is not real science. Besides, they claim, there are many other explanations for the slight amount of global warming that explain the changes better, such things as solar activities, ocean tides, galactic influences, land use changes, growth of urban centres, changes in vegeta-



tions, etc. And these critics further point out that climate is changing all the time, and not necessarily for the worse.

This issue can become confusing with “climate change alarmists” and “climate change deniers” facing off against one another. Can one legitimately question or critique the prevailing wisdom on this issue? It is a complex and complicated problem. In this learning supplement we present the arguments pro and con relative to these and other claims associated with the climate change controversy. We invite you to join the discussion and help your students to assess the relative merits of the arguments in play. Challenge them to think, based on the evidence and the conflicting claims.

## The Basic Framework

If one cannot define the basic terms it is impossible to obtain a clear understanding of the “problem”. Therefore, some general questions to stimulate discussion might include the following:

1. What is climate? What is weather? What is the difference?
2. What is climate change? Is it not occurring all the time? What causes climate change?
3. When did global warming become a public issue?
4. What events precipitated its coming to public attention? Was it political events or scientific curiosity?
5. What is the role of solar activity?
6. What is the role of carbon dioxide? If carbon dioxide is an absolute necessity for all living things why should it be called a pollutant by believers in global warming?
7. “No matter if the science is all phony, there are collateral environmental benefits....climate change provides the greatest opportunity to bring about equality and justice in the world.” Christine Stewart, (PC) was Canada’s Minister of the Environment in the Harper government and she signed the Kyoto Accord. What should one make of these types of statements?
8. Where does the money come from, for the fellowship grants, conferences, speaking tours, research papers, etc., for people engaged in this public issue? Which foundations?
9. If climate science is an interdisciplinary field (not just a branch of geography), what are some of the other scientific disciplines involved in the collection of reliable data, records, statistics, that form the basis for study and interpretation of the evidence?
10. Are climate change believers environmental extremists in disguise or are they the true prophets of an impending disaster if their warnings are not heeded?

## Here are a few definitions:

### 1. From Wikipedia

*Climate change is a change in the statistical distribution of **weather** patterns when that change lasts for an extended period of time (i.e., decades to millions of years). Climate change may refer to a change in average weather conditions, or in the time variation of weather within the context of longer-term average conditions. Climate change is caused by factors such as **biotic** processes, variations in **solar radiation** received by Earth, **plate tectonics**, and **volcanic eruptions**. Certain human activities have been identified as primary causes of ongoing climate change, often referred to as **global warming**.<sup>1</sup>*

[https://en.wikipedia.org/wiki/Climate\\_change](https://en.wikipedia.org/wiki/Climate_change)

### 2. Intergovernmental Panel on Climate Change (IPCC)

*Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed*



man activity. Global warming is one measure of climate change, and is a rise in the average global temperature.

<https://davidsuzuki.org/what-you-can-do/what-is-climate-change/>

#### 4. The UAE (United Arab Emirates) gives this definition:

*When we talk about climate change, we mean any long-term change in the average weather patterns in a particular area. Average weather patterns include average temperature, rainfall, wind conditions and numerous other climatic conditions. These changes may take place due to the dynamic processes of the Earth (e.g. volcano eruptions or earthquakes), due to external forces (e.g. changes in the intensity of solar radiation or fall of large meteorites), or due to human activities (e.g. deforestation, tree burning or the three types of pollution – land, air and sea), resulting in an ecological imbalance, the disappearance of certain animal and plant species, and the appearance of others.*

<https://beeatna.ae/en/definition-of-climate-change>

#### 5. UK Department of Energy and Climate Change gives this definition:

*“Climate Change*

*The process of changing weather patterns caused by the increased number of greenhouse gases in the global atmosphere as a result of human activity since the beginning of the Industrial Revolution.”*

[https://unfccc.int/files/press/backgrounders/application/pdf/press\\_factsh\\_science.pdf](https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf)

#### 6. NASA article for grade 5 level



*The climate of a region or city is its typical or average weather. For example, the climate of Hawaii is sunny and warm. But the climate of Antarctica is freezing cold. Earth’s climate is the average of all the world’s regional climates... ...Climate change, therefore, is a change in the typical or average weather of a region or city. This could be a change in a region’s average annual rainfall, for example. Or it could be a change in a city’s average temperature for a given month or season.....Climate change is also a change in Earth’s overall climate. This could be a change in Earth’s average temperature, for example. Or it could be a change in Earth’s typical precipitation patterns.*

<https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-climate-change-58.html>

*directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.*

[http://www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/mains1.html](http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html)

#### 3. David Suzuki Foundation

*In a nutshell, climate change occurs when long-term weather patterns are altered — for example, through hu-*



### Questions

1. How are the definitions similar?
2. How do they differ significantly?
3. Why do they differ?
4. What is problematic about the IPCC’s double definition?
5. What is climate science?
6. The scientific method demands a hypothesis and a way/experiment to test the hypothesis. Is climate science real science if its conclusions cannot be tested?



## Background Resources

There are many print and digital resources available on the topic of climate change. Some, like the film, *An Inconvenient Truth*, helped former American presidential candidate, Al Gore, win a Nobel Peace Prize. Many of the videos contain contentious information and points of view, ranging from scientific reports to popular alarmist projections of imminent disaster for the planet, its human inhabitants and all living things, plants, animals, bird and fish. Some of the videos verge on the incredulous, bordering on propaganda, but some are science based. The list of videos that follows consist of mostly of short explanations or discussions (from 5-30 minutes in length) of the theory/topic/problem of climate change. Numbers 1-2 are casual debates with some humour. Numbers 3-10 offer different aspects from climate change proponents, with 6-7 focusing primarily on the negative role of carbon dioxide. Numbers 11-14 offer alternate explanations that question the accepted wisdom and downplay the role of carbon dioxide.

*As a teaching strategy, the teacher could divide the class into two units, or perhaps 5 work groups depending on the class size, and assign different videos for viewing and summary of arguments. Then each group could present their respective findings/conclusions based on what they viewed. There should be some conflicting conclusions based on the material viewed. This in turn should spark a lively debate.*

1. <https://www.youtube.com/watch?v=gWT-EWKIR3M> Climate Realist Marc Morano Debates Bill Nye the Science Guy on Global Warming
2. <https://www.youtube.com/watch?v=I0leiw0x6w0> Is Global Warming FAKE ? (Neil Degrasse Tyson vs Bob Lutz)
3. <https://www.youtube.com/watch?v=ifrHogDujXw> Climate Change Explained
4. <https://www.youtube.com/watch?v=ARUY1wPfDI8> Scientists: Climate Change May Wipe Out Third of World's Parasites, With Disastrous Ripple Effects
5. <https://www.youtube.com/watch?v=7mYJ9GJMgaw> 7 INSANE Effects of Climate Change in Your Lifetime
6. <https://www.youtube.com/watch?v=XVH2yVQ5xvM> Game Over for the Climate?
7. <https://www.youtube.com/watch?v=ujkcTZZlikg> Richard Alley - 4.6 Billion Years of Earth's Climate History: The Role of CO2 [makes argument for carbon dioxide as being most important knob for raising the planet's temperature]
8. <https://www.skepticalscience.com/argument.php> Global Warming & Climate Change Myths In this print article one finds essentially a skepticism about those who are skeptical about the reality of any global warming. It offers 113 one line responses against so called "myths" about climate change.
9. [https://insideclimatenews.org/news/04062015/global-warming-great-hiatus-gets-debunked-NOAA-study?gclid=EAlaIqobChMlyqzb8q051gIVQp7ACh2nDwHfEAMYAiAAEgJ7RvD\\_BwE](https://insideclimatenews.org/news/04062015/global-warming-great-hiatus-gets-debunked-NOAA-study?gclid=EAlaIqobChMlyqzb8q051gIVQp7ACh2nDwHfEAMYAiAAEgJ7RvD_BwE) Global Warming's Great Hiatus Gets Another Debunking. In this article an effort is made to debunk the global warming deniers' claims, saying that in effect, there has been no hiatus or slowdown in global warming for the decade of 1994-2014.
10. <http://timeforchange.org/climate-change/popular> Cause and Effect for Global Warming. Stresses that global warming (equated with climate change) is caused by the emission of greenhouse gases and this in turn is caused primarily by the activities of human beings. Definition, cause and effect, possible solutions. With respect to the effects of global warming by region, it provides a scary scenario of the worst results that could come about.
11. [https://www.youtube.com/watch?v=TCy\\_U0jEir0](https://www.youtube.com/watch?v=TCy_U0jEir0) Nobel Laureate [Ivar Giaever] Smashes the Global Warming Hoax
12. <https://www.youtube.com/watch?v=i0bmapEm2a4> CLIMATE HYSTERIA - Judith Curry on Climategate, Consensus and Bullying. Reputable scientists disagree with the prevailing wisdom, offer scientific evidence for their claims of skepticism.
13. <https://www.youtube.com/watch?v=anZJCvGoZE> Milankovitch Cycles and Ice Age Explained
14. [http://www.independent.org/store/book.asp?id=42&s=ga&gclid=EAlaIqobChMlppKs97S51gIVFVuGCh0lcQeNEAAYASAAEgIIS\\_D\\_BwE](http://www.independent.org/store/book.asp?id=42&s=ga&gclid=EAlaIqobChMlppKs97S51gIVFVuGCh0lcQeNEAAYASAAEgIIS_D_BwE) Presents a review of a skeptical scientist's book *Hot Talk, Cold Science*. In his book Dr. Fred Singer explores the inaccuracies in historical climate data, the limitations of attempting to model climate on computers, solar variability and its impact on climate, the effects of clouds, ocean currents, and sea levels on global climate, and factors that could mitigate any human impacts on world climate. Singer notes how many proposed "solutions" to the global warming "crisis" (like "carbon" taxes) would have severe consequences for economically disadvantaged groups and nations.
15. <http://hockeyschtick.blogspot.ca/2014/02/imf-chief-unless-we-take-action-on.html> The Hockey Schtick article debunks the computer models on which many of the climate change/global warming claims rely.



Neil Degrasse Tyson



Prof. Judith Curry



Dr. Fred Singer

Here are three of the many comments readers had about the ideas presented by Dr. Singer:

**Clare Goldsberry** Climate change is indeed a natural phenomenon that has been taking place for millions of years. The Arctic and Antarctic were once tropical and evidence of ice ages past litter the Sahara desert. It's just another way for those in power to get more power and more money and destroy our economy.

**Paul Helgoth** Yes, it's a natural phenomenon... but it's also a human-caused one. Why do you all think that all climate drivers have to fall into the same category? You think that because the earth's climate changes naturally (due to any number of cyclic factors, including solar cycles, La Nina, variations in the earth's orbit/tilt) that it can't also change due to human activity? Why would one exclude the other? This continues to be the single worst argument that climate change deniers come up with... that somehow the existence of natural variability means that human-induced climate change cannot exist. It's a completely illogical argument!

**jimkritett** Most 'deniers' are not saying that at all. What they are saying is in fact, when you see groups that are willing to lie about and manipulate data in order to get the results they want, something is not right. When the answer to the problem is to take money and move it around, with the majority of it ending up in the pockets of people like Mr. 'I made Millions in this industry' Al Gore while being one of the worst individual polluters (like all who would profit from it) tends to blunt the belief in their sincerity and the severity of anything man is causing or can do to cease it. ...The truth of 'deniers' is that they don't deny climate change, they deny that it [human activities] is solely the cause (if in fact even a major factor) in it.

## An Excellent Balanced Source

<https://climatechange.procon.org/>

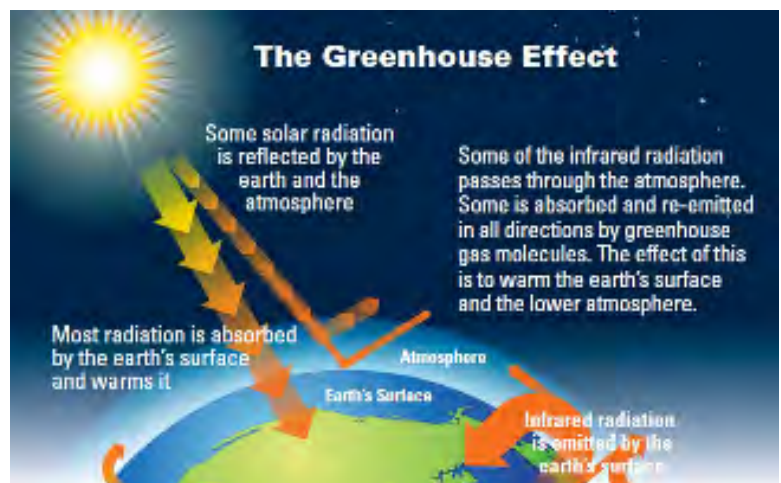
For a balanced approach to the debate on climate change consult this website. It provides cogent arguments for each side, making it a fair source on the topic. The issue appears to be far from "settled science" as the proponents of climate change (understood as global warming) claim, but also something that cannot be dismissed out of hand as bad science. The title of the article is "Is Human Activity Primarily Responsible for Global Climate Change?" But, prior to the main body of the discussion, an introductory article precedes it and lays out the ground work by chronicling the history of the issue.

### Background of the Issue

*The greenhouse effect illustrated.*

Source: US Environmental Protection Agency (EPA), "Frequently Asked Questions about Global Warming and Climate Change: Back to Basics," [www.epa.gov](http://www.epa.gov) (accessed Mar. 12, 2015)

Temperatures on earth have increased approximately 1.4°F since the early 20th century. [99] Over this time period, atmospheric levels of greenhouse gases such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) have notably increased. [10][11] Both sides





in the debate surrounding global climate change agree on these points.

The pro side argues rising levels of atmospheric greenhouse gases are a direct result of human activities such as burning fossil fuels, and that these increases are causing significant and increasingly severe climate changes including global warming, loss of sea ice, sea level rise, stronger storms, and more droughts. They contend that immediate international action to reduce greenhouse gas emissions is necessary to prevent dire climate changes.

The con side argues human-generated greenhouse gas emissions are too small to substantially change the earth's climate and that the planet is capable of absorbing those increases. They contend that warming over the 20th century resulted primarily from natural processes such as fluctuations in the sun's heat and ocean currents. They say the theory of human-caused global climate change is based on questionable measurements, faulty climate models, and misleading science.

### Early Science on Greenhouse Gasses and Climate Change

Carbon dioxide (CO<sub>2</sub>) is released and absorbed in the global carbon cycle.

Source: United States Department of Energy "Simplified Global Carbon Cycle," <http://genomics.energy.gov> (accessed June 2, 2010)

Scientists have known of the heating potential (greenhouse effect) of gases such as CO<sub>2</sub> since at least 1859, when British physicist John Tyndall first began experiments leading to the discovery that CO<sub>2</sub> in the atmosphere absorbs the sun's heat. [126]

On Feb. 16, 1938 engineer Guy S. Callendar published an influential study suggesting increased atmospheric CO<sub>2</sub> from fossil fuel combustion was causing global warming. [127] Many scientists at that time were skeptical of Callendar's conclusion, arguing that that natural fluctuations and atmospheric circulation changes determined the climate, not CO<sub>2</sub> emissions. [158]

In Mar. 1958 US climate scientist Charles Keeling began measuring atmospheric CO<sub>2</sub> at the Mauna Loa observatory in Hawaii for use in climate modeling. [128] Using these measurements, Keeling became the first scientist to confirm that atmospheric CO<sub>2</sub> levels were rising rather than being fully absorbed by forests and oceans (carbon sinks). [129] When Keeling began his measurements, atmospheric CO<sub>2</sub> levels stood at 315 parts per million (ppm). [10]

In 1977 the US National Academy of Sciences issued the report "Energy and Climate" concluding that the burning of fossil fuels was increasing atmospheric CO<sub>2</sub>, and that increased CO<sub>2</sub> was associated with a rise in global temperatures. [130]

On June 23, 1988 National Aeronautics and Space Administration (NASA) scientist James Hansen presented testimony to the US Senate stating directly that increases in CO<sub>2</sub> were warming the planet and "changing our climate." [131] [132] At the time, MIT meteorologist Richard Lindzen criticized these findings, arguing that computerized climate models were unreliable and that natural processes would balance out any warming caused by increased CO<sub>2</sub>. [133]

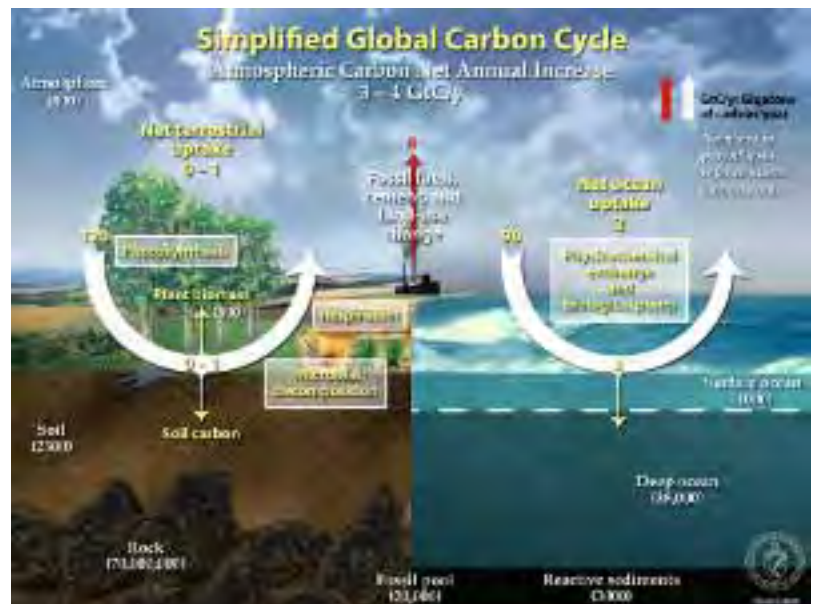


Image of protestors at the Sep. 21, 2014 Peoples Climate March in New York, NY. Photograph by Christine Irvine, [survivalmediaagency.com](http://survivalmediaagency.com).

Source: <http://peoplesclimate.org> (accessed Mar. 12, 2015)

## Formation of the IPCC and the UN Framework Convention on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was created in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to review research on global climate change (as of Feb. 2015, there were 195 IPCC member countries). [136] The IPCC issued its first assessment report in 1990 stating that “emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases,” resulting in “an additional warming of the Earth’s surface.” [135]

The United Nations Framework Convention on Climate Change (UNFCCC) was signed by US President George Bush on Oct. 13, 1992. [137] The goal of the convention was the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” [138]

Each UNFCCC member state gained representation in the Conference of Parties (COP). Starting in Mar. 1995 with the COP 1, the conference of parties has met every year for a conference on climate change. [159]

## The Kyoto Protocol and Other International Conferences on Climate Change



Cartoon satirizing Vice President Al Gore and his views on global warming.

Source: <http://1.bp.blogspot.com> (accessed June 11, 2010) On Mar. 2, 2008 the Heartland Institute sought to challenge the idea that human activity was causing climate change by holding its own international conference on climate change. At the conference, 98 speakers including PhD climate scientists from major universities argued that global warming was most likely a natural event. [148]

In Dec. 2009 the COP 15 conference took place in Copenhagen, Denmark. The resulting Copenhagen Accord, signed by 114 nations including the United States and China, called for “deep cuts” in human greenhouse gas emissions in order to make sure that earth’s temperature rises no more than 1.5°C above pre-industrial levels. [142]

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In Apr. 2010 Bolivia hosted an alternative to the UN COP conferences. The World People’s Conference on Climate Change and the Rights of Mother Earth was attended by representatives from nearly 130 countries. [143] The People’s Agreement reached at the conference demanded that developed countries lower CO2 levels back to 300 ppm (from 389 ppm), and rejected the Copenhagen Accord for its “insufficient reductions in greenhouse gases.” It stated that “[c]limate change is now producing profound impacts on agriculture and the ways of life of indigenous peoples and farmers throughout the world.” [144]

In 2012 the COP 18 conference was held in Doha, Qatar. At the conference the COP expressed “grave concern” that member states were not lowering greenhouse gas emissions fast enough to meet the Copenhagen Accord’s mandate to prevent the earth’s temperature from rising more than 1.5°C above pre-industrial levels. [160]

In Dec. 2015, the COP 21 met in Paris where 195 countries, including the United States, adopted the Paris Agreement. [176] [178] The agreement’s central aim was to prevent global temperatures from rising more than 1.5°C - 2°C above pre-industrial levels. Under the agreement, all countries were required to create a national



plan to reduce greenhouse gas emissions and report regularly on their individual progress towards meeting their emission reduction goals. [177] Then President Obama called the agreement a “turning point for the world” that “establishes the enduring framework the world needs to solve the climate crisis.” [179]

On June 1, 2017, President Trump announced his intention to withdraw the United States from the Paris Agreement and ordered the federal government to “cease all implementation” of the agreement. President Trump said the Paris Agreement had imposed “draconian financial and economic burdens” on the United States and created “serious obstacles” to energy development. [180] [181]

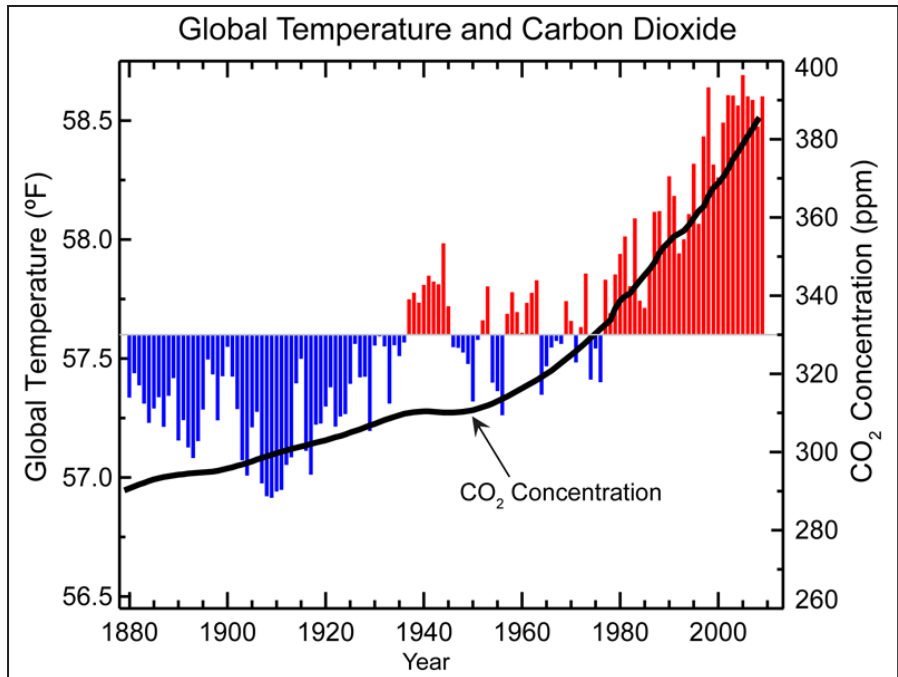
### US Debate over Climate Change Heats Up

Al Gore’s documentary *An Inconvenient Truth* premiered in 2006 and was seen by over 5 million people worldwide. The film argued that human-caused climate change was real, and that without immediate reductions in greenhouse gas emissions, catastrophic climate changes would severely disrupt human societies, leading to a possible collapse of industrial civilization. [145]

In 2007 the IPCC released its Fourth Assessment Report stating that “warming of the climate system is unequivocal” and that “most of the observed increase in global average temperatures since the mid-20th century is very likely [90% confidence] due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.” [170] The IPCC and Al Gore received a Nobel Peace Prize for their climate science work in Oct. 2007. [146] In response to the IPCC findings, a group of scientists formed the Nongovernmental International Panel on Climate Change (NIPCC) to compile a report challenging the science behind man-made climate change. Their Mar. 2, 2008 report, “Nature, Not Human Activity, Rules the Climate,” was published by the Heartland Institute. [147]

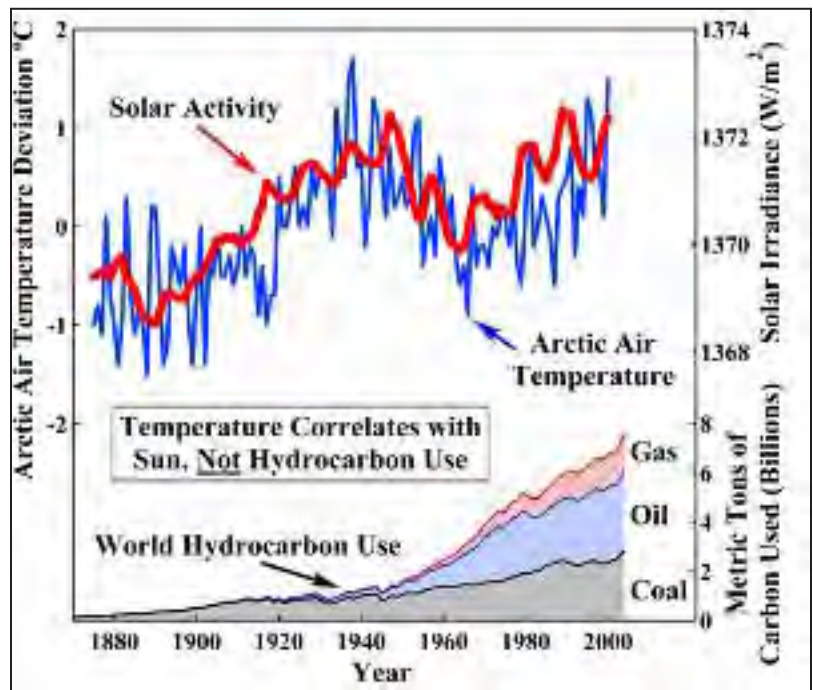
From 1998-2009 the US government appropriated \$99 billion for work related to climate change. \$35.7 billion (36%) of that total came as part of the American Recovery and Reinvestment Act of 2009. [151]

On Apr. 2, 2007 the US Supreme Court ruled (5-4) in *Massachusetts v. EPA* that greenhouse gases met the criteria to be considered pollutants under the Clean Air Act. [149] In response, the US EPA announced in 2009 that greenhouse gases “threaten public health” and are “the primary driver of climate change.” [150] In its June



Graph showing that rising CO2 levels correlate with higher global temperatures.

Source: National Oceanic and Atmospheric Administration, “Global Climate Change Indicators,” [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov) (accessed Mar 12, 2015)



Graph showing that Arctic air temperature (blue line) parallels natural solar activity (red line).

Source: Oregon Institute of Science and Medicine, “Environmental Effects of Increased Atmospheric Carbon Dioxide,” *Journal of American Physicians and Surgeons*, Fall 2007



23, 2014 decision in *Utility Air Regulatory Group v. EPA*, the US Supreme Court upheld the EPA's authority to regulate greenhouse gas emissions from stationary sources such as power plants. [96]

In May 2013, President Barack Obama tweeted to his millions of Twitter followers that “Ninety-seven percent of scientists agree: #climate change is real, man-made and dangerous.” The 97% number was taken from Cook’s 2013 meta-study of 11,944 peer-reviewed papers on climate change. The study’s authors found that, of the 3,974 studies that took a position on human-caused climate change, 97.1% agreed that human activity is causing global warming. [1] The study’s methodology was criticized by skeptics who point to the fact that only 65 of the 11,944 (0.5%) of the abstracts endorsed the position that human activity is primarily responsible (+50%) for global warming. [54]

On Sep. 21, 2014 the largest climate march in history took place in New York, NY, with over 400,000 people marching to demand that world governments take immediate action to reduce greenhouse gas emissions. [161]

### **How Will Climate Change Affect Us?**

According to NOAA’s National Climatic Data Center, 2014 was the hottest year on record across the globe since 1880 when record keeping began. The 10 warmest years in this 135-year period occurred between 1998 and 2014. [94]

As of Jan. 2015, CO2 levels were 399.96 ppm, up from 315.7 ppm when measurements began in 1958. [10] These CO2 levels are reportedly higher than at any time in the last 650,000 years when levels fluctuated between 180 and 300 ppm. [102]

As of 2010 the US had 4.5% of the world’s population but was responsible for about 28% of all global greenhouse gas emissions. [103] In 2011 global emissions of human-produced CO2 were about 34 billion tons, [16] the equivalent of about 408 billion shipping containers full of greenhouse gases. [20]

Predictions about how climate changes will affect civilization range from a Department of Defense report [154] detailing catastrophic weather events and a “significant drop in the human carrying capacity of the Earth’s environment,” to an Oregon Institute of Science and Health report detailing “an increasingly lush environment of plants and animals.” [155]

### **Latest IPCC Findings, National Climate Assessment, and Counterpoints**

On Sep. 27, 2013 the IPCC announced that it is now “extremely likely [95% confidence] that human influence has been the dominant cause of the observed warming since the mid-20th century.” [156]

The Heartland Institute argued against human-caused global warming in its 2013 NIPCC report which said that global warming since 1860 is the result of natural “cycles driven by ocean-atmosphere oscillations, or by solar variations.” [67]

The US Global Change Research Program released the 2014 National Climate Assessment on May 6, 2014. The report called climate change “a global public health problem,” stated that climate change impacts are already “visible in every state,” and concluded that human-induced “climate change is happening now.” [16] The report was criticized by some members of Congress including US Senator James Inhofe (R-OK), who stated that “we can all agree that natural variations in the climate are taking place, but man-made global warming still remains a theory.” [157]

In Nov. 2014 the IPCC stated in the summary of its Fifth Assessment Report on global climate change that “Human influence on the climate system is clear,” and that “recent climate changes have had widespread impacts on human and natural systems.” It went on to say that continued emission of greenhouse gases “will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems.” [24]

### **Questions on this Background Summary**

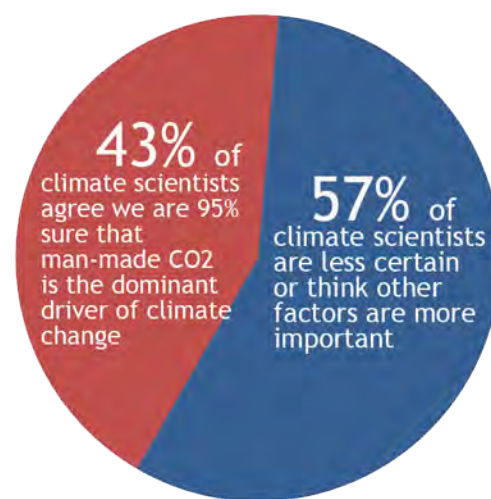
1. If science is objective based on facts, why are scientists in such disagreement over the nature and cause of climate change/global warming?
2. What basic facts do the two sides agree on?
3. How and why do the two sides disagree about the role of carbon dioxide?
4. When we see these large crowds of protesters (like the estimated 400,000 in New York) with color signs commercially prepared, who is organizing them? What organizations and insitutions are funding them?

5. Which nations were the first to sound alarms over “climate change as global warming”?
6. What is the IPCC? How was it created and for what purpose?
7. What did the cartoon on Al Gore suggest? What groups might like the cartoon? Is it accurate?
8. What was the Kyoto Protocol? What was it intended to achieve? Why was it a failure?
9. Why would the United States be the only major developed nation not to sign the protocol?
10. Why were large countries like China, India, Russia, Brazil quite happy to sign the protocol?
11. What did the protocol say? How would those nations be in any way restricted in their use of fossil fuels and energies in developing their economies forward?
12. What is the Heartland Institute? Who created it? For what purpose?
13. How can governments make commitments like the Copenhagen Accord?
14. Can human beings really control the climate of the planet? Is this a sort of arrogance on the part of human beings or is this a realistic goal?
15. Why conference on climate was held in Bolivia in 2010 and what did it propose? How was it different from previous COP Conferences?
16. What did the Paris Agreement call for? Why did President Trump withdraw the United States from it?
17. The conclusions of the two sets of scientists regarding the planet’s prospective future demonstrate a huge difference of opinion – “catastrophic weather events” and “a significant drop in the human carrying capacity of the Earth’s environment” versus “an increasingly lush environment of plants and animals”. Who is right?
18. Should courts of law get involved in science and industry issues? Why or why not?
19. What is the controversy about the 97% claim regarding scientists?
20. What conclusions have you drawn from the climate change debate?

## The Main Arguments Pro and Con



There is no consensus...



jonova

The arguments can be summarized in several statements representative of the thinking on the subject. The extracts are drawn from articles or papers put out by individual scientists and politicians or by certain bodies or institutions like NASA and the IPCC.

**PRO (yes) Climate change is real and is caused by human activities producing greenhouse gases**

**The National Aeronautics and Space Administration (NASA)**, in the “Climate Change: How Do We Know?” section of its website, available at [nasa.gov](http://nasa.gov) (accessed May 17, 2017), wrote:

“The **current warming trend** is of particular significance because most of it is extremely likely (greater than 95 percent probability) to be the **result of human activity since the mid-20th century** and proceeding at a rate that is unprecedented over decades to millennia...



- Global sea level rose about 8 inches in the last century. The rate in the last two decades, however, is nearly double that of the last century.
- The planet's average surface temperature has risen about 2.0 degrees Fahrenheit since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. Most of the warming occurred in the past 35 years, with **16 of the 17 warmest years on record occurring since 2001**. Not only was 2016 the warmest year on record, but eight of the 12 months that make up the year - from January through September, with the exception of June - were the warmest on record for those respective months...
- Since the beginning of the Industrial Revolution, **the acidity of surface ocean waters has increased by about 30 percent**. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans."

**Iliisa Ocko, PhD, Climate Scientist at the Environmental Defense Fund (EDF)**, in a Mar. 23, 2017 article titled "How Do We Know That Humans Are Causing Climate Change? These Nine Lines of Evidence," available at edf.org, wrote: "We are **statistically more confident that humans cause climate change** than that smoking causes cancer..."

The research falls into nine independently-studied but physically-related lines of evidence, that build to the overall clear conclusion that **humans are the main cause of climate change**:

1. **Simple chemistry** that when we burn carbon-based materials, carbon dioxide (CO<sub>2</sub>) is emitted (research beginning in 1900s)
2. **Basic accounting of what we burn**, and therefore how much CO<sub>2</sub> we emit (data collection beginning in 1970s)
3. **Measuring CO<sub>2</sub> in the atmosphere and trapped in ice** to find that it is indeed increasing and that the levels are higher than anything we've seen in hundreds of thousands of years (measurements beginning in 1950s)
4. **Chemical analysis of the atmospheric CO<sub>2</sub>** that reveals the increase is coming from burning fossil fuels (research beginning in 1950s)
5. **Basic physics** that shows us that CO<sub>2</sub> absorbs heat (research beginning in 1820s)
6. Monitoring climate conditions to find that recent **warming of the Earth is correlated to and follows rising CO<sub>2</sub> emissions** (research beginning in 1930s)
7. **Ruling out natural factors** that can influence climate like the Sun and ocean cycles (research beginning in 1830s)
8. **Employing computer models** to run experiments of natural vs. human-influenced 'simulated Earths' (research beginning in 1960s)
9. **Consensus among scientists** that consider all previous lines of evidence and make their own conclusions (polling beginning in 1990s)...

**The science is settled, and the sooner we accept this**, the sooner we can work together towards addressing the problems caused by climate change - and towards a better future for us all."

**Will Steffen, PhD, Emeritus Professor at the Australian National University**, in a Feb. 12, 2017 article by Melissa Davey titled "Humans Causing Climate to Change 170 Times Faster than Natural Forces," for guardian.com, stated:



"We are not saying the **astronomical forces of our solar system or geological processes** have disappeared, but in terms of their impact in such a short period of time they **are now negligible compared with our own influence**..."

[W]hile other forces operate over millions of years, we as humans are having an impact at the same strength as the many of these other forces, but in the timeframe of just a couple of centuries.

The **human magnitude of climate change looks more like a meteorite strike than a gradual change**."



**The Intergovernmental Panel on Climate Change (IPCC)** stated the following in its Nov. 2014 “Climate Change 2014 Synthesis Report,” available at [ipcc.ch](http://ipcc.ch):

“Human influence on the climate system is clear, and **recent anthropogenic emissions of greenhouse gases are the highest in history**. Recent climate changes have had widespread impacts on human and natural systems...

**Warming of the climate system is unequivocal**, and since the 1950s, many of the **observed changes are unprecedented over decades to millennia**. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.

**Anthropogenic greenhouse gas emissions have increased since the pre-industrial era**, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely [95% confidence] to have been the dominant cause of the observed warming since the mid-20th century.”

**James E. Hansen, PhD, former Director of the Goddard Institute for Space Studies at NASA**, et al., stated the following in their Aug. 6, 2012 study “Perception of Climate Change,” published in the *Proceedings of the National Academy of Sciences*:

There are many other human-induced stresses on life... yet global warming caused by fossil fuel burning may be a unique threat because of the millennial time scale of anthropogenic carbon within surface carbon reservoirs.

It has been argued that a scenario phasing out carbon emissions fast enough to stabilize climate this century, **limiting further warming** to a maximum of several tenths of a degree Celsius, is still possible, but it **would require a rising price on carbon emissions** sufficient to spur transition to a clean energy future without burning all fossil fuels.



**Peter Gleick, PhD, CEO of the Pacific Institute**, stated the following in his Jan. 16, 2012 article “Climate Change, Disbelief, and the Collision Between Human and Geologic Time,” available at [forbes.com](http://forbes.com):

“**Climate does change naturally for reasons well understood by scientists**. But it does so over thousands or tens of thousands of years – time scales so slow as to be imperceptible to humans...

**Human-caused climate changes are different**. As the planet’s population has grown to 7 billion people, and as we have learned how to mobilize vast quantities of carbon-based fossil fuels (ironically, created over geologic time scales) to satisfy our short-term energy demands, we have become powerful enough to overwhelm slow geological cycles. **We are, for the first time in the 4+ billion year history of the Earth capable of altering the largest geophysical system on the planet – the climate** – and we are doing it on a human time scale of years and decades, with consequences we are only just beginning to comprehend. And ironically, our effect on the climate is still slow enough for policy makers, climate contrarians and skeptics, and those simply not paying attention to either actively deny it or to just look the other way, committing the planet to more and more change...

**The National Academy of Sciences** stated the following in the introduction to their May 19, 2010 report “Advancing the Science of Climate Change,” available at the website of the National Academy of Sciences:

Projections of future climate change indicate that **Earth will continue to warm unless significant and sustained actions are taken to limit emissions of GHGs**. These increases in temperature and GHG concentrations are driving a multitude of related and interacting changes in the Earth system, including decreases in the amounts of ice stored in mountain glaciers and Polar Regions, increases in sea level, changes in ocean chemistry, and changes in the frequency and intensity of heat waves, precipitation events, and droughts. These changes in turn pose significant risks to both human and ecological systems.”

**Michael E. Mann, PhD, Professor in the Departments of Meteorology and Geosciences at Pennsylvania State University**, stated the following in his Feb. 10, 2010 article “Science Supports Climate Change Claims - A Letter from Michael Mann,” available at [www.voicesweb.org](http://www.voicesweb.org):

“[T]he scientific case for human-caused climate change is clear. The evidence includes independent assessments of thermometer records documenting the degree and extent of modern warming. It includes the unprecedented melting of glaciers and, as documented in more recent years, the diminution of the Greenland and Antarctic ice sheet. **As a consequence of melting ice and warming oceans, the global sea level is rising and at an accelerating**



**rate.** Continental drought is becoming more pronounced in many extratropical regions, such as the deserts of the U.S. Southwest, and there is an increase in the destructive potential of Atlantic hurricanes that influence the east and Gulf coasts. Theoretical climate models predict these things to happen, but only when human influences - in particular, increasing greenhouse gas concentrations due to fossil fuel burning—are included.

**The United Nations Framework Convention on Climate Change (UNFCCC)** stated the following in its publication “Feeling the Heat,” available at unfccc.int (accessed May 12, 2010):

“The average temperature of the earth’s surface has risen by 0.74 degrees C since the late 1800s. It is expected to increase by another 1.8° C to 4° C by the year 2100 - a rapid and profound change - should the necessary action not be taken...

The **principal reason for the mounting thermometer is a century and a half of industrialization:** the burning of ever-greater quantities of oil, gasoline, and coal, the cutting of forests, and the practice of certain farming methods....

These activities have increased the amount of ‘**greenhouse gases**’ in the atmosphere, especially carbon dioxide, methane, and nitrous oxide. Such gases occur naturally - they are critical for life on earth, they keep some of the sun’s warmth from reflecting back into space, and without them the world would be a cold and barren place. But in augmented and increasing quantities, **they are pushing the global temperature to artificially high levels** and altering the climate. Eleven of the last 12 years are the warmest on record...

**The current warming trend is expected to cause extinctions.** Numerous plant and animal species, already weakened by pollution and loss of habitat, are not expected to survive the next 100 years. Human beings, while not threatened in this way, are likely to face mounting difficulties. Recent severe storms, floods and droughts, for example, appear to show that computer models predicting more frequent ‘extreme weather events’ are on target.”

**Al Gore, Jr., former Vice President of the United States and Chairman of the Board at the Alliance for Climate Protection,** stated the following in his Feb. 27, 2010 article “We Can’t Wish Away Climate Change,” published in the *New York Times*:

“[T]he scientific enterprise will never be completely free of mistakes. What is important is that the **overwhelming consensus on global warming remains unchanged...**

Here is what scientists have found is happening to our climate: man-made global-warming pollution traps heat from the sun and increases atmospheric temperatures. **These pollutants - especially carbon dioxide** - have been increasing rapidly with the growth in the burning of coal, oil, natural gas and forests, and temperatures have increased over the same period. Almost all of the ice-covered regions of the Earth are melting - and seas are rising. Hurricanes are predicted to grow stronger and more destructive, though their number is expected to decrease. Droughts are getting longer and deeper in many mid-continent regions, even as the severity of flooding increases. The seasonal predictability of rainfall and temperatures is being disrupted, posing serious threats to agriculture. The rate of species extinction is accelerating to dangerous levels.”

### Questions for the section on the pro arguments

1. List the main items of evidence cited by those who claim that climate change/global warming is indeed real.
2. Which are the strongest arguments? and which are questionable? [may wish to take into account the CON section of the arguments below]
3. What are some of the worst projected impacts of such climate change on the planet and its living ecosystem? Are any potential benefits mentioned in any of these arguments?
4. What can be done to stop this calamity?
5. Does it all come down to money? Why not simply outlaw certain processes if they are dangerous to the world and to everyone’s health?

CON (no) Climate change does exist because such change goes on all the time, but it is not proven that global warming is caused by primarily by human activities. There are other natural forces at play. Human activity may be contributing but not to the dramatic extent claimed by many people.

**The International Climate Science Coalition (ICSC)**, a coalition of 140+ climate scientists, economists, and engineers, in the “Core Principles” section of its website (accessed May 17, 2017), wrote:

“Global climate is always changing in accordance with natural causes and recent changes are not unusual...”

Science is rapidly evolving away from the view that humanity’s emissions of carbon dioxide and other ‘greenhouse gases’ are a cause of dangerous climate change...

Climate models used by the IPCC [United Nations’ Intergovernmental Panel on Climate Change] fail to reproduce known past climates without manipulation and therefore lack the scientific integrity needed for use in climate prediction and related policy decision-making...

Claims that ‘consensus’ exists among climate experts regarding the causes of the modest warming of the past century are contradicted by thousands of independent scientists...

Research that identifies the Sun as a major driver of global climate change must be taken more seriously...

Carbon dioxide and other ‘greenhouse gas’ emissions from human activity - energy production, transportation, cement production, heating and cooling, etc.- appear to have only a very small impact on global climate.”

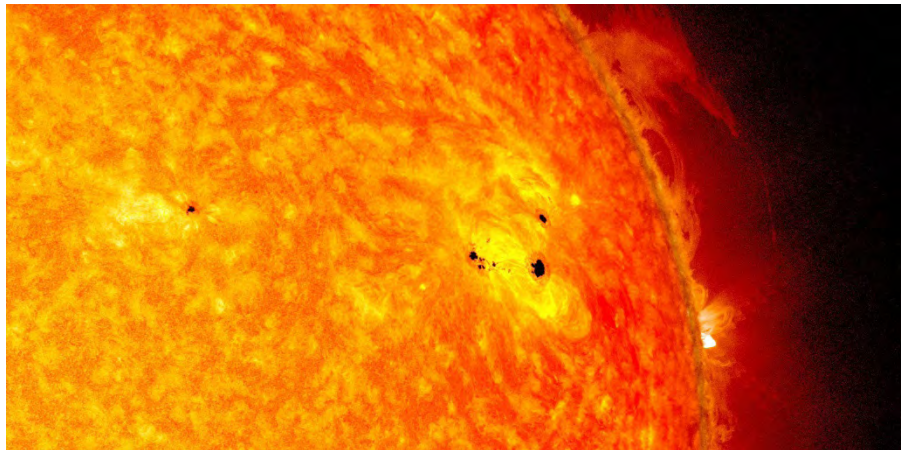
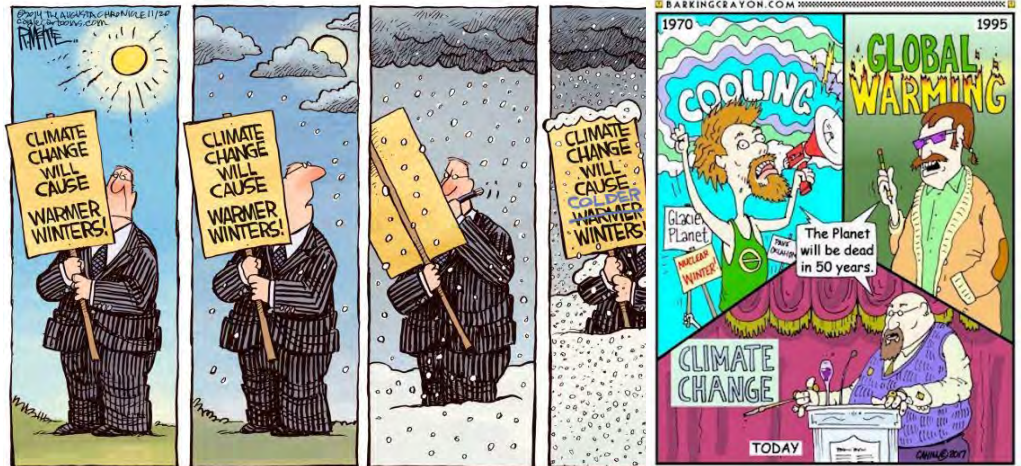
**H. Sterling Burnett, PhD, Research Fellow at the Heartland Institute**, in a Jan. 9, 2017 article for the Heartland Institute blog titled “Climate Change 101: The Evidence Humans Aren’t Destroying the Climate,” wrote:

“Climate change is real and has happened throughout history on local, regional, continent-wide, and global scales, driven by a variety of atmospheric, cosmic, geologic, and meteorological factors...”

[A]t the worst, humans are having a modest effect on Earth’s climate, with the increase in carbon dioxide possibly having a net beneficial effect (due to the enhanced plant productivity resulting from higher carbon-dioxide levels)...

Anthropogenic warming theorists’ climate models assume temperatures should climb alongside rising carbon-dioxide levels, yet temperatures fell from the 1940s through the 1970s, even while emissions were rising dramatically. For the past two decades, carbon-dioxide levels have continued to increase, but global satellites have recorded no significant temperature increase for 18 years...

Almost all the harmful impacts predicted by climate models are failing to materialize. For instance, climate models predicted more intense hurricanes, but for nearly a decade, the United States has experienced far fewer hurricanes making landfall than the historic average, and those hurricanes that have made landfall have been no more powerful than previously experienced.”





**William Happer, PhD, Emeritus Professor of Physics at Princeton University and former Director of Energy Research at the US Department of Energy**, in a Feb. 7, 2017 opinion piece for the *Post Bulletin* titled “William Happer: Climate Change Is Being Used as a Political Hobgoblin,” wrote:

“Climate has been changing since the Earth was formed - some 4.5 billion years ago. Climate changes on every time scale - whether decades, centuries or millennia.

The climate of Greenland was warm enough for farming around the year 1100 A.D., but by 1500, the Little Ice Age drove Norse settlers out...

But none of the climate change of the past was due to humans. The very minor warming in the past few centuries is mostly from non-human causes as well... Yes, carbon dioxide is a greenhouse gas, but much less important than the major greenhouse gas, water vapor, H<sub>2</sub>O, and clouds...

Observations, including the extended ‘hiatus’ in warming since about the year 2000 - which is poised to continue now that the El Nino warming of 2015-2016 is behind us - show that more atmospheric carbon dioxide will cause only modest warming of the Earth’s surface....

Many sincere people, without the time or training to dig into the facts, have been misled by the demonization of carbon dioxide....

This seems to be a recurrent feature of human history. In past centuries, some of the most educated members of society wrote learned books on how to ferret out witches and presided in trials where witches were condemned to death.

There never was a threat from witches, and there is no threat from increasing carbon dioxide.”

**Patrick Moore, PhD, Chair and Chief Scientist of Greenspirit Strategies Ltd. and former Director of Greenpeace International**, stated the following in his Feb. 25, 2014 Senate Environment and Public Works Committee testimony “Natural Resource Adaptation: Protecting Ecosystems and Economies,” available at epw.senate.gov:

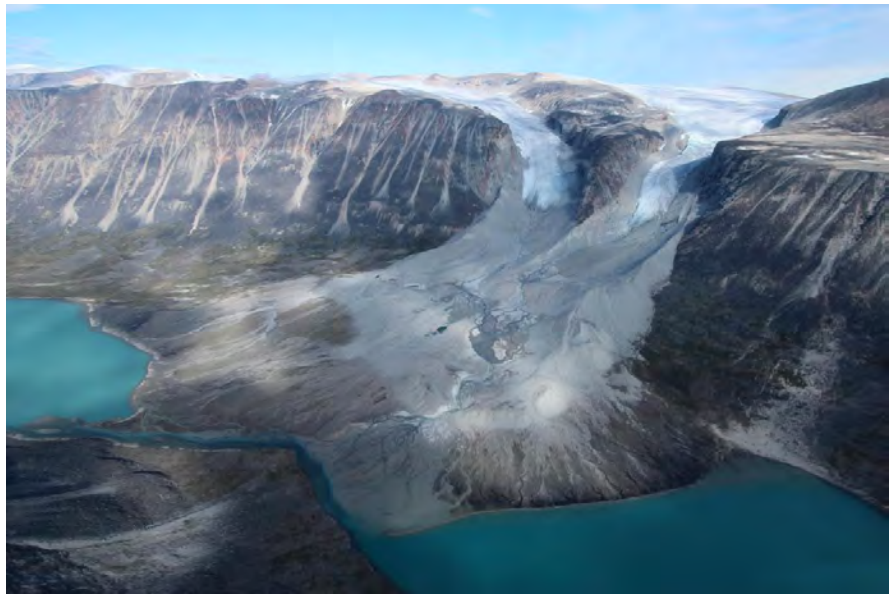
“There is no scientific proof that human emissions of carbon dioxide (CO<sub>2</sub>) are the dominant cause of the minor warming of the Earth’s atmosphere over the past 100 years. If there were such a proof it would be written down for all to see. No actual proof, as it is understood in science, exists...

When modern life evolved over 500 million years ago, CO<sub>2</sub> was more than 10 times higher than today, yet life flourished at this time. Then an Ice Age occurred 450 million years ago when CO<sub>2</sub> was 10 times higher than today. There is some correlation, but little evidence, to support a direct causal relationship between CO<sub>2</sub> and global temperature through the millennia. The fact that we had both higher temperatures and an ice age at a time when CO<sub>2</sub> emissions were 10 times higher than they are today fundamentally contradicts the certainty that human-caused CO<sub>2</sub> emissions are the main cause of global warming.”

**Richard S. Lindzen, PhD, Emeritus Professor of Meteorology at the Massachusetts Institute of Technology (MIT)**, stated the following in his article, “Climate of Fear: Global Warming Alarmists Intimidate Dissenting Scientists into Silence,” *Wall Street Journal*, Apr. 12, 2006:

“There have been repeated claims that this past year’s hurricane activity was another sign of human-induced climate change. Everything from the heat wave in Paris to heavy snows in Buffalo has been blamed on people burning gasoline to fuel their cars, and coal and natural gas to heat, cool and electrify their homes. Yet how can a barely discernible, one-degree increase in the recorded global mean temperature since the late 19th century possibly gain public acceptance as the source of recent weather catastrophes? And how can it translate into unlikely claims about future catastrophes?...

Global temperature has risen about a degree since the late 19th century; levels of CO<sub>2</sub> in the atmosphere



have increased by about 30% over the same period; and CO<sub>2</sub> should contribute to future warming. These claims are true. However, what the public fails to grasp is that the claims neither constitute support for alarm nor establish man's responsibility for the small amount of warming that has occurred... It isn't just that the alarmists are trumpeting model results that we know must be wrong. It is that they are trumpeting catastrophes that couldn't happen even if the models were right as justifying costly policies to try to prevent global warming."



**John R. Christy, PhD, M.Div, Professor of Atmospheric Science and Director of the Earth System Science Center at the University of Alabama**

at Huntsville, provided the following testimony on Aug. 1, 2012 before the US Senate Environment and Public Works Committee, available at [epw.senate.gov](http://epw.senate.gov):

"It is popular again to claim that extreme events, such as the current central US drought, are evidence of human-caused climate change. Actually, the Earth is very large, the weather is very dynamic, and extreme events will continue to occur somewhere, every year, naturally..."

New discoveries explain part of the warming found in traditional surface temperature datasets. This partial warming is unrelated to the accumulation of heat due to the extra greenhouse gases, but related to human development around the thermometer stations...

Widely publicized consensus reports by 'thousands' of scientists are misrepresentative of climate science, containing overstated confidence in their assertions of high climate sensitivity...

...[C]limate models overestimate the response of temperature to greenhouse gas increases. Also shown was a lack of evidence to blame humans for an increase in extreme events. One cannot convict CO<sub>2</sub> of causing any of these events, because they've happened in the past before CO<sub>2</sub> levels rose...

It is a simple fact that CO<sub>2</sub> is plant food and the world around us evolved when levels of CO<sub>2</sub> were five to ten times what they are today. Our green world is a consequence of atmospheric CO<sub>2</sub>. And, food for plants means food for people. The extra CO<sub>2</sub> we are putting into the atmosphere not only invigorates the biosphere, but also enhances the yields of our food crops. This is a tremendous benefit to nature and us in my view..."

**Willie Soon, PhD, Physicist at the Harvard-Smithsonian Center for Astrophysics**, stated the following in his Nov. 2007 article "Implications of the Secondary Role of Carbon Dioxide and Methane Forcing in Climate Change: Past, Present, and Future," published in *Physical Geography*:

"There is no quantitative evidence that varying levels of minor greenhouse gases like CO<sub>2</sub> and CH<sub>4</sub> have accounted for even as much as half of the reconstructed glacial-interglacial temperature changes or, more importantly, for the large variations in global ice volume on both land and sea over the past 650kyr [650,000 years]. This paper shows that changes in solar insolation [amount of solar energy hitting the earth] at climatically sensitive latitudes and zones exceed the global radiative forcings [greenhouse gas accumulation in the atmosphere trapping solar heat] of CO<sub>2</sub> and CH<sub>4</sub> by severalfold..."

[T]he popular notion of CO<sub>2</sub> and CH<sub>4</sub> radiative forcing as the predominant amplifier of glacial-interglacial phase transitions cannot be confirmed...

Our basic hypothesis is that long-term climate change is driven by insolation changes, from both orbital variations and intrinsic solar magnetic luminosity variations. This implies natural warming and cooling variations."

**Harrison H. Schmitt, PhD, Geologist, Honorary Associate Fellow of Engineering at the University of Wisconsin at Madison and former US Senator and NASA Astronaut, and William Happer, PhD, Professor of Physics at Princeton University**, stated the following in their May 8, 2013 article "Harrison H. Schmitt and William Happer: In Defense of Carbon Dioxide," available at [wsj.com](http://wsj.com):

"The cessation of observed global warming for the past decade or so has shown how exaggerated NASA's and most other computer predictions of human-caused warming have been—and how little correlation warming



has with concentrations of atmospheric carbon dioxide. As many scientists have pointed out, variations in global temperature correlate much better with solar activity and with complicated cycles of the oceans and atmosphere. There isn't the slightest evidence that more carbon dioxide has caused more extreme weather...

The current levels of carbon dioxide in the earth's atmosphere, approaching 400 parts per million, are low by the standards of geological and plant evolutionary history. Levels were 3,000 ppm, or more, until the Paleogene period (beginning about 65 million years ago). For most plants, and for the animals and humans that use them, more carbon dioxide, far from being a 'pollutant' in need of reduction, would be a benefit...



We know that carbon dioxide has been a much larger fraction of the earth's atmosphere than it is today, and the geological record shows that life flourished on land and in the oceans during those times. The incredible list of supposed horrors that increasing carbon dioxide will bring the world is pure belief disguised as science."

**The Center for the Study of Carbon Dioxide and Global Change, in a position statement written by Chairman C.D. Idso, PhD, and Vice President K.E. Idso, PhD,** stated the following in its 2008 publication "Carbon Dioxide and Global Warming: Where We Stand on the Issue," available at [co2science.org](http://co2science.org):

"There is little doubt the air's CO<sub>2</sub> concentration has risen significantly since the inception of the Industrial Revolution; and there are few who do not attribute the CO<sub>2</sub> increase to the increase in humanity's use of fossil fuels. There is also little doubt the earth has warmed slightly over the same period; but there is no compelling reason to believe that the rise in temperature was caused by the rise in CO<sub>2</sub>...

Proponents of the notion that increases in the air's CO<sub>2</sub> content lead to global warming point to the past century's weak correlation between atmospheric CO<sub>2</sub> concentration and global air temperature as proof of their contention. However, they typically gloss over the fact that correlation does not imply causation, and that a hundred years is not enough time to establish the validity of such a relationship when it comes to earth's temperature history...

In thus considering the seven greatest temperature transitions of the past half-million years - three glacial terminations and four glacial inceptions - we note that increases and decreases in atmospheric CO<sub>2</sub> concentration not only did not precede the changes in air temperature, they followed them, and by hundreds to thousands of years...

Hence, the climate history of the past half-million years provides absolutely no evidence to suggest that the ongoing rise in the air's CO<sub>2</sub> concentration will lead to significant global warming...

Proponents of the CO<sub>2</sub>-induced global warming hypothesis often predict that extreme weather events such as droughts, floods, and hurricanes will become more numerous and/or extreme in a warmer world; however, there is no evidence to support this claim. In fact, many studies have revealed that the numbers and intensities of extreme weather events have remained relatively constant over the last century."

**Tim Ball, PhD, former Geography Professor at the University of Winnipeg,** stated the following in his July 7, 2008 article "Alarmists Use Weather to Promote Global Warming Hoax," available at the website of *Canada Free Press*:

"Claims that recent severe weather and flooding in the US are proof of human CO<sub>2</sub> impacts on global climate are scientific nonsense...

Those who perpetrated possibly the greatest deception in human history that CO<sub>2</sub> is causing global warming/climate change are scared. Events are driving them to extreme, unsubstantiated and even ridiculous claims and threats.

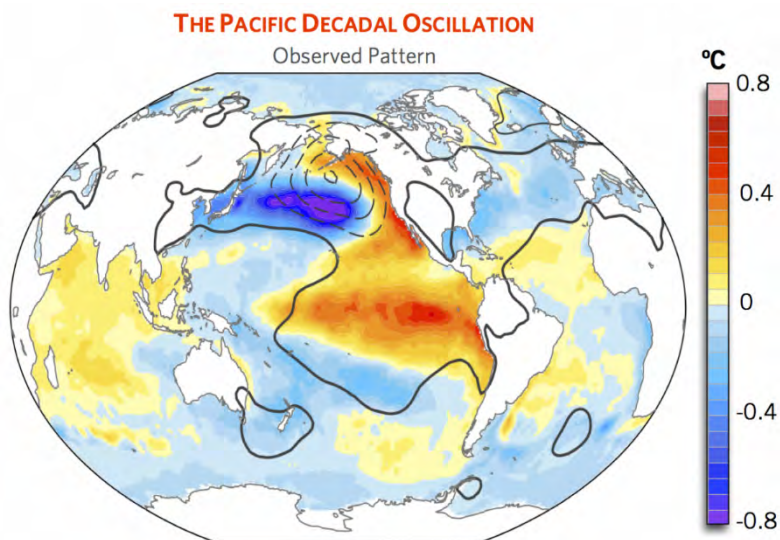
One of these was that sea level would rise, but it foundered when the two Nobel Peace Prize winners, the Inter-

governmental Panel on Climate Change (IPCC) and Al Gore were in serious disagreement. Another was [Arctic sea ice except it returned to long term normal levels](#) last winter and NASA announced the one year anomaly was due to changes in wind patterns.

So they return to their central theme of convincing you that normal weather events are abnormal...

Proponents of human caused climate change will... continue their practice of claiming natural events as unnatural. Unless people understand the basic science they will continue the fraud and pressure politicians into even more damaging energy and environmental policies."

**Don J. Easterbrook, PhD, Emeritus Professor of Geology at Western Washington University**, stated the following in his June 28, 2014 article "Global Cooling Is Here," available at [globalresearch.ca](http://globalresearch.ca):



"Despite no global warming in 10 years and recording-setting cold in 2007-2008, the Inter-governmental Panel on Climatic Change (IPCC) and computer modelers who believe that CO2 is the cause of global warming still predict the Earth is in store for catastrophic warming in this century..."

Global warming of the past century (0.8° C) is virtually insignificant when compared to the magnitude of at least 10 global climate changes in the past 15,000 years. None of these sudden global climate changes could possibly have been caused by human CO2 input to the [atmosphere](#) because they all took place long before [anthropogenic CO2 emissions](#) began. The cause of the ten earlier 'natural' climate changes was most likely the same as the cause of global warming from 1977 to 1998...

The [Pacific Ocean](#) has a warm temperature mode and a cool temperature mode, and in the past century, has switched back forth between these two modes every 25-30 years (known as the Pacific Decadal Oscillation or PDO). In 1977 the Pacific abruptly shifted from its cool mode (where it had been since about 1945) into its warm mode, and this initiated global warming from 1977 to 1998...

Global warming (i.e, the warming since 1977) is over. The minute increase of anthropogenic CO2 in the atmosphere (0.008%) was not the cause of the warming - it was a continuation of natural cycles that occurred over the past 500 years."

**William Gray, PhD, Professor Emeritus of Atmospheric Science at Colorado State University**, stated the following in his Apr. 7, 2010 article, "MIT Professor's Climate Change Op-Ed Proven False," available at the Heartland Institute website:

"A high percentage of meteorologists and/or climate scientists do not agree that the climate changes we have seen are mostly manmade. Thousands of us think the larger part of the climate changes we have observed over the last century are of natural origin. I believe most of the [changes that have been observed are due to multi-decadal and multi-century changes in deep global ocean currents](#). Such changes have yet to be properly incorporated into the global models or into most climate modelers' thinking..."

Many scientists believe a [slightly warmer world would be, in general, more beneficial for humanity](#). The small changes in climate we have seen so far and the changes we will likely see in the coming decades are not potentially dangerous. It has been noted that vegetation growth is enhanced by higher CO2 levels...

[T]he global climate models will never be able to replicate the complex global atmosphere / ocean environment and its continuing changes...

We should all [call out faulty science wherever we see it](#), including the blind belief (without any evidence beyond the faulty models) that humans are largely responsible for climate change."

**Roy W. Spencer, PhD, Principal Research Scientist at the Earth System Science Center at the University of Alabama** in Huntsville, stated the following in his Oct. 20, 2008 article "Global Warming as a Natural Response to Cloud Changes Associated with the Pacific Decadal Oscillation," available at [droospencer.com](http://droospencer.com):



“[W]e are finding satellite evidence that the climate system is much less sensitive to greenhouse gas emissions than the U.N.’s Intergovernmental Panel on Climate Change (IPCC, 2007) climate models suggest that it is. And if that is true, then mankind’s CO<sub>2</sub> emissions are not strong enough to have caused the global warming we’ve seen over the last 100 years...

[M]ost of the warming could be the result of a natural cycle in cloud cover forced by a well-known mode of natural climate variability: the Pacific Decadal Oscillation (PDO). While the PDO is primarily a geographic re-arrangement in atmospheric and oceanic circulation patterns in the North Pacific, it is well known that such regional changes can also influence weather patterns over much larger areas...

[R]ecent satellite measurements - even though they span only 7.5 years - support the Pacific Decadal Oscillation as a potential major player in global warming and climate change.”

**Steven F. Hayward, PhD, FK Weyerhaeuser Fellow at the American Enterprise Institute for Public Policy Research**, stated the following in his Mar. 15, 2010 article “In Denial,” available at [www.aei.org](http://www.aei.org):

“The models the IPCC uses for projecting a 3 to 4 degree Celsius increase in temperature all assume large positive (that is, temperature-magnifying) feedbacks from a doubling of carbon dioxide in the atmosphere...

If the climate system is less sensitive to greenhouse gases than the climate campaign believes, then what is causing plainly observable changes in the climate, such as earlier arriving springs, receding glaciers, and shrinking Arctic Ocean ice caps?...

The IPCC downplays theories of variations in solar activity, such as sunspot activity and gamma ray bursts, and although there is robust scientific literature on the issue, even the skeptic community is divided about whether solar activity is a primary cause of recent climate variation. Several studies of Arctic warming conclude that changes in ocean currents, cloud formation, and wind patterns in the upper atmosphere may explain the retreat of glaciers and sea ice better than greenhouse gases... Above all, if the medieval warm period was indeed as warm or warmer than today, we cannot rule out the possibility that the changes of recent decades are part of a natural rebound from the ‘Little Ice Age’ that followed the medieval warm period and ended in the 19th century.”

**The George C. Marshall Institute**, a science and public policy organization, stated the following in its July 23, 2009 publication “The Cocktail Conversation Guide to Global Warming,” available at [www.marshall.org](http://www.marshall.org):

“[G]lobal surface temperatures have not increased since about 1998. Since the late 1800s, the world’s average surface temperature is believed to have warmed about 1°F, which is, in part, a natural recovery from the ‘Little Ice Age,’ a period of global cooling lasting from about 1400 to the 1800s AD...

[N]atural flows of CO<sub>2</sub> in and out of the Earth’s surface average about 20 times the human contribution...

Predictions of future climate come from computer models, which are very incomplete approximations of the behavior of the real climate system... The predictions of future climatic changes are hypotheses, not scientific facts...

Whatever the threat of climate change to humanity, it is most likely to be natural — not man-made.”

**James M. Inhofe, United States Senator (R-OK)**, stated the following in his Sep. 25, 2006 speech “Hot & Cold Media Spin: A Challenge to Journalists Who Cover Global Warming,” available at [epw.senate.gov](http://epw.senate.gov):

“I am going to speak today about the most media-hyped environmental issue of all time, global warming...”

The media have missed the big pieces of the puzzle when it comes to the Earth’s temperatures and mankind’s carbon dioxide (CO<sub>2</sub>) emissions. It is very simplistic to feign horror and say the one degree Fahrenheit temperature increase during the 20th century means we are all doomed. First of all, the one degree Fahrenheit rise coincided with the greatest advancement of living standards, life expectancy, food production and human health in the history of our planet. So it is hard to argue that the global warming we experienced in the 20th century was somehow negative or part of a catastrophic trend.

Second, what the climate alarmists and their advocates in the media have continued to ignore is the fact that the Little Ice Age, which resulted in harsh winters which froze New York Harbor and caused untold deaths, ended about 1850. So trying to prove man-made global warming by comparing the well-known fact that today’s temperatures are warmer than during the Little Ice Age is akin to comparing summer to winter to show a catastrophic temperature trend.

In addition, something that the media almost never addresses are the holes in the theory that CO<sub>2</sub> has been the driving force in global warming. Alarmists fail to adequately explain why temperatures began warming at the

end of the Little Ice Age in about 1850, long before man-made CO<sub>2</sub> emissions could have impacted the climate. Then about 1940, just as man-made CO<sub>2</sub> emissions rose sharply, the temperatures began a decline that lasted until the 1970's, prompting the media and many scientists to fear a coming ice age.

Let me repeat, **temperatures got colder after CO<sub>2</sub> emissions exploded**. If CO<sub>2</sub> is the driving force of global climate change, **why do so many in the media ignore the many skeptical scientists who cite these rather obvious inconvenient truths?**"

### **Questions for discussion of the contrarian arguments on climate change and human responsibility for it.**

1. Are the two cartoons depicting skepticism effective? Why or why not?
2. What are the main arguments which the contrarians use to rebut the claims of climate change promoters?
3. Why is the role and function of carbon dioxide so crucial to all the pro and con arguments?
4. What does science actually say about the role of carbon dioxide in the plant, living process and in the planet's ecosystem?
5. What historical statistics and temperature data support the contrarian's skepticism?
6. Is an increase in the presence of carbon dioxide in the earth's atmosphere, on balance, a positive or a negative factor for human and plant life?
7. Is there any justification for seeing the climate change claims of alarmists as a money grabber by governments and green energy industrial complex?
8. You now have been exposed to arguments from each of the two sides of the debate. How can both sets of arguments be right? Is it possible to reconcile the two arguments?
9. **If** the case has not truly been made in favor of human-caused global warming, why err on the side of great human suffering and loss of jobs by passing laws that punish development and put people out of work?
10. What are the potential consequences for adopting the respective positions? Is one set worse than the other?





## An Introduction by Lay People, Non-Scientists

Here are a few representative articles published in the last few months. The articles are written by journalists not by scientists. The articles can be read in their entirety at the original web site. The first article accepts the conventional claims that proliferate in the media, while the second article takes a different and more questioning approach. The third article suggests a conspiratorial approach to climate change.



### Climate Change Is Already Wreaking Havoc on Our Weather, Scientists Find

[Justin Worland](http://time.com/5064577/climate-change-arctic/) December 15, 2017 <http://time.com/5064577/climate-change-arctic/>

Too frigid for global warming? This is why they rebranded it ‘climate change’

[Rex Murphy, National Post, January 5, 2018](http://nationalpost.com/opinion/rex-murphy-too-frigid-for-global-warming-this-is-why-they-rebranded-it-climate-change) <http://nationalpost.com/opinion/rex-murphy-too-frigid-for-global-warming-this-is-why-they-rebranded-it-climate-change>

### How Trump saved freedom and democracy from the Climate Industrial Complex

[Peter Foster, November 3, 2017](http://business.financialpost.com/opinion/peter-foster-how-trump-saved-freedom-and-democracy-from-the-climate-industrial-complex) <http://business.financialpost.com/opinion/peter-foster-how-trump-saved-freedom-and-democracy-from-the-climate-industrial-complex>

### Questions

1. What does the *Time Magazine* article conclude about climate change and the weather experienced recently?
2. “Scientists have explored the link between climate change and extreme weather events for years, but many of the conclusions have relied on forecasts of potential future damage. This year, scientists say, the findings are no longer theoretical. Man-made global warming is causing problems here and now”. Does this statement reflect fact or is it mere opinion?
3. What evidence is cited to justify the claims and reports?
4. Do these conclusions make sense to you?
5. What does Rex Murphy say about climate and weather?
6. Is he a skeptic or a believer in climate change? Why?
7. Does Murphy make sense with his insights?
8. How does Murphy use humour? Who does he poke fun at? Is his use of humour effective?
9. How does Foster answer his own opening question about President Donald Trump?
10. What does Darwall mean by the “Climate Industrial Complex”?
11. What does Foster suggest is the political/economic motivation behind the “roots of environmental ideology”? How was the “corruption of science by politicized scientists” a critical factor according to Foster?
12. How was “the U.S. ...the overwhelming problem for the global governors”?

13. Which nations and industries have benefited from the climate change scare according to Foster?
14. Why is this a telling statistic for Foster: “over the period 1999–2012, German power-station emissions increased by 17.2-million metric tons, while their American counterparts cut their emissions by 10 times that amount”?
15. What does Foster criticize about Canada and Ontario’s energy policies?
16. Does it make sense to spend enormous amounts of public money on the goal of stopping or reversing “global temperatures”?

## Climate Change Impact

A little noticed but important side issue associated with climate change/global warming is a form of extreme environmental, expressing itself in an almost kind of despair and dislike of the human race itself, the belief that the planet would be much better off if the earth had considerably fewer people, or maybe people of a certain background or people with a certain carbon footprint. According to these folks the fewer the people the better for the remaining few who can then enjoy its resources, riches etc. and thus save the pristine condition of the planet itself.

The following article has been redacted.

### Want to Slow Climate Change? Stop Having Babies

#### The alternative? “Give up your toys.”

*Eric Roston*, September 23, 2016

Carbon dioxide doesn’t kill climates; people do. And the world would be better off with fewer of them. That’s a glib summary of a serious and seriously provocative book, *Towards a Small Family Ethic: How Overpopulation and Climate Change Are Affecting the Morality of Procreation* by Travis Rieder, a moral philosophy professor and bioethicist at Johns Hopkins University.

When economists write about climate change, they’ll often bring up something called the Kaya identity—basically a multiplication problem (not an espionage novel) that helps economists estimate how much carbon dioxide may be heading into the atmosphere. The Kaya identity says the pace of climate pollution is more or less the product of four things: 1. How carbon-heavy fuels are 2. How much energy the economy needs to produce GDP 3. GDP per capita 4. Population.

An edited interview transcript of an interview with him follows.

*Q: So. What seems to be the problem?*

*A:* There are 19 million adoptable orphans, and there’s catastrophic climate change on the horizon. Contributing a child to the world both makes climate change worse and, if we don’t get our act together, it might actually not be all that great for the child either.... You have two tracks. You could say climate change is a big structural problem, so it requires a structural solution; that’s a policy question. Or you could say a problem like climate change requires that we change our culture of individual obligation, and everybody needs to think about having small families.

*Q: That seems like a pretty heavy ask. People don’t even want to think about having small bags of movie popcorn.*

*A:* Well, the argument goes like this: Okay, humans have shown me that they’re just not willing to give up their toys. And so we need another option on the table. You want to continue to live in your 10,000-square-foot house? You know, fly private jets around, and that kind of thing? Well, that would mean a lot fewer people on the Earth.

*Q: At least in the carbon-heavy countries? Do you think that would actually ever happen?*

*A:* Mostly I want to put it on the table. Population is a central part of the equation for total emissions, but that gets kind of looked over because people don’t like to talk about it. Total emissions is per-capita emissions times population, minus technological advances. We’ve been trying to get you to give up your toys—to change per-capita emissions. So if you’re really going to continue to show reluctance, well, here’s the other option: We’ll start putting pressure on families. If that pressure’s really, really, really undesirable, then, well, maybe people



decide to start doing the other thing. ...If we could fix everything through decarbonizing our economy, then it's likely that the population variable wouldn't be a real concern.

*Q: It does have the distinct unpleasant feel of a moral gun to the head.*

A: Here's my actual suspicion, though: Most people don't find it that undesirable. Demographic trends the world over show when you give women choice, you educate them, you give them power in the household, and you start to fight back against patriarchal society, then fertility rates go down.

*Q: People are helpful to have around, though, if you want to have an economy. China may learn that the hard way.*

A: This is the most infamous example, but it turns out there's been a lot of countries with pretty influential fertility-reducing policies and strategies. What we found is that some of them are really, really good. That's one of the reasons people balk at this sort of argument. They say, 'Look what happened in China.' None of those are arguments against any kind of strategies; those are arguments against the ways the Chinese government employed them. We put policies on a

kind of spectrum of invasiveness, what we call a coercion spectrum. There are things we obviously should never do. You should never violate basic human rights by forced sterilization or forced abortion. That's off the table. We're not going to talk about that. Nobody's going to talk about that....But this is actually really good fertility policy: Provide family planning. Provide your people with health care. Educate women, and empower women within the home. There have been media policies, poster campaigns. Some of them are a little nasty, showing lots and lots of poor people reaching through gates and saying, 'Don't have too many kids, we don't have enough jobs.' And stuff like that. That feels a little nasty. Some of them are just, like, happy pictures of a couple with one child saying, 'Please stop at one.' A lot of these media campaigns had verifiable success. Data was collected and fertility rates dropped.

*Q: Pope Francis wants to fight climate change, but I'm not sure he'd be down with your full argument here.*

A: Religion—not only Catholicism but Mormonism, ultra-orthodox Judaism, that sort of thing—probably is a really good reason to think about using population as a way to raise the stakes. If you're Catholic, and you're really going to stare climate change in the face, refuse contraception, and continue to have sex anyway, there's the foreseeable outcome that you will have more children than average. Well, then you really better be doing your darnedest in all sorts of other ways. When you make that choice, there's a cost. You have to pay for it in some way.



### Questions

1. What assumptions does the book's author make about the size of homes that people inhabit? How many people anywhere in the world live in homes of 10,000 sq. ft in area?
2. Rieder equates a higher level of carbon dioxide with climate pollution, but is he correct in making that assumption? Is carbon dioxide a pollutant or something absolutely necessary for a thriving, living planet? [think of how much warmer was the period when dinosaurs lived on earth]
3. Rieder believes a smaller population would be better for all concerned, including the health of the planet itself. What is his reasoning for this?
4. What are the two solutions to the problem according to Rieder? Wouldn't technological advances make it possible for more people to live on the planet and maintain an acceptable carbon dioxide level in the atmosphere?
5. Rieder does not recommend forcible policies to bring about smaller populations, what alternative does he see working?
6. Given that the two most populated countries in the world are India and China, and they are both experiencing tremendous economic growth, does his analysis hold?

<http://www.bloomberg.com/news/articles/2016-09-23/want-to-slow-climate-change-stop-having-babies-bioethicist-travis-rieder-says>